IrDA Infrared communication Module

RPM871-H14

RPM871-H14 is an infrared communication module for IrDA Ver. 1.2 (Low Power). The infrared LED, PIN photo diode, waveform shaping LSI are all integrated into a single package. This module is designed with power down function and low current consumption at stand-by mode. The ultra small package makes it a perfect fit for mobile devices.

●Features

1) Applied to IrDA version 1.2. (Low Power)
2) Designed for low power consumption at stand-by for receiving (Typ.73μA).
3) Suitable for sets driven by battery due to power down control function.
4) Power supply voltage range : 2.6V to 3.6V
5) Constant LED load resistance can change communication range. (Approx. 20 to 60cm)

●Applications

Cellular phones, PDAs, etc.

●Absolute maximum ratings (Ta = 25°C)

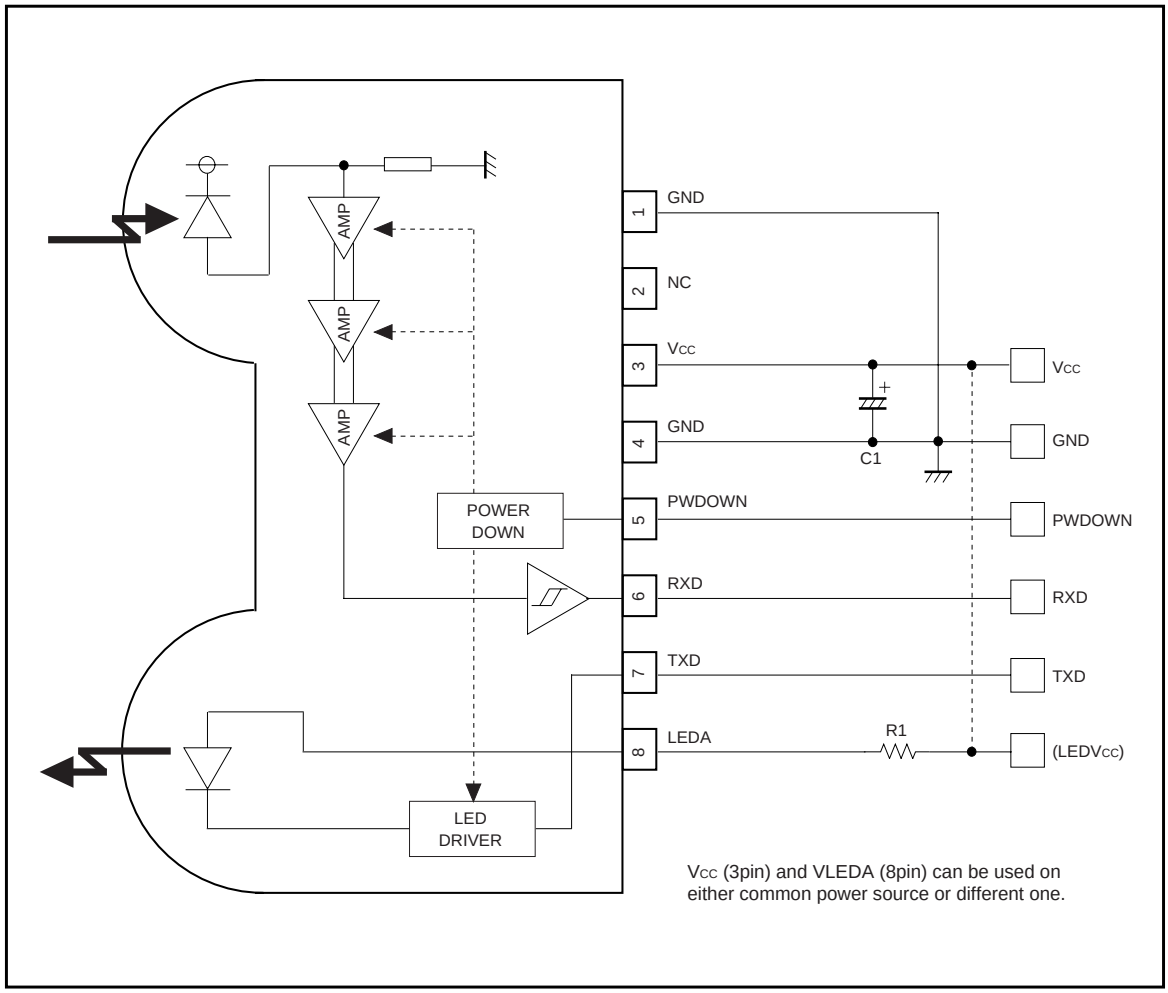
Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	7.0	V
Input voltage	Vin	–0.3 to V_{CC}+0.3	V
Power dissipation	Pd	150*1	mW
Operating temperature range	Topr	–20 to +85	°C
Storage temperature range	Tstg	–30 to +100	°C
LED peak current	I_{FP}	200*2	mA

*1 70mm×70mm, t=1.6mm, glass epoxy mounting. Derating : 2mW/°C for operation above Ta=25°C
*2 LED peak current<90μs. ON duty<20%

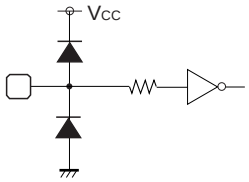
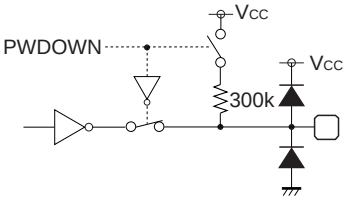
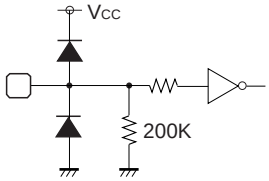
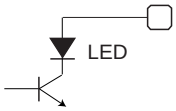
●Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V_{CC}	2.6	3.0	3.6	V
	V_{LEDA}	2.6	2.8	5.5	V

●**Block diagram and application circuit**



●**Terminal description**

Pin No	Terminal	Circuit	Function
1, 4	GND		GND Pin1 and pin4 must be connected to the ground.
2	NC		This Terminal must be left open.
3	V_{CC}		V_{CC} For preventing from infection, connect a capacitor between V_{CC} (3pin) and GND (4pin).
5	PWDOWN		Power-down Control Terminal H : POWERDOWN L : OPERATION CMOS Logic Level Input When input is H, it will stop the receiving circuit, Pin-PD current and transmitting LED operation.
6	RXD		Receiving Data Output Terminal CMOS Logic Level Output When PWDOWN (5pin)=H, the RXD output will be pulled up to V_{CC} at approximately 300kΩ.
7	TXD		Transmitting Data Input Terminal H : LED (PWDOWN=L) CMOS Logic Level Input Holding TXD="H" status, LED will be turn off approximately 45µs.
8	LEDA		LED ANODE Terminal Other power source can be used difference between LEDV_{CC} and V_{CC}. LED current depends on LED load resistance value.
–	Shield Case		Connect to Ground.

●**Electrical characteristics** (Unless otherwise noted, V_{CC}=2.8V, VLEDV_{CC}=2.8V, Ta=25°C)

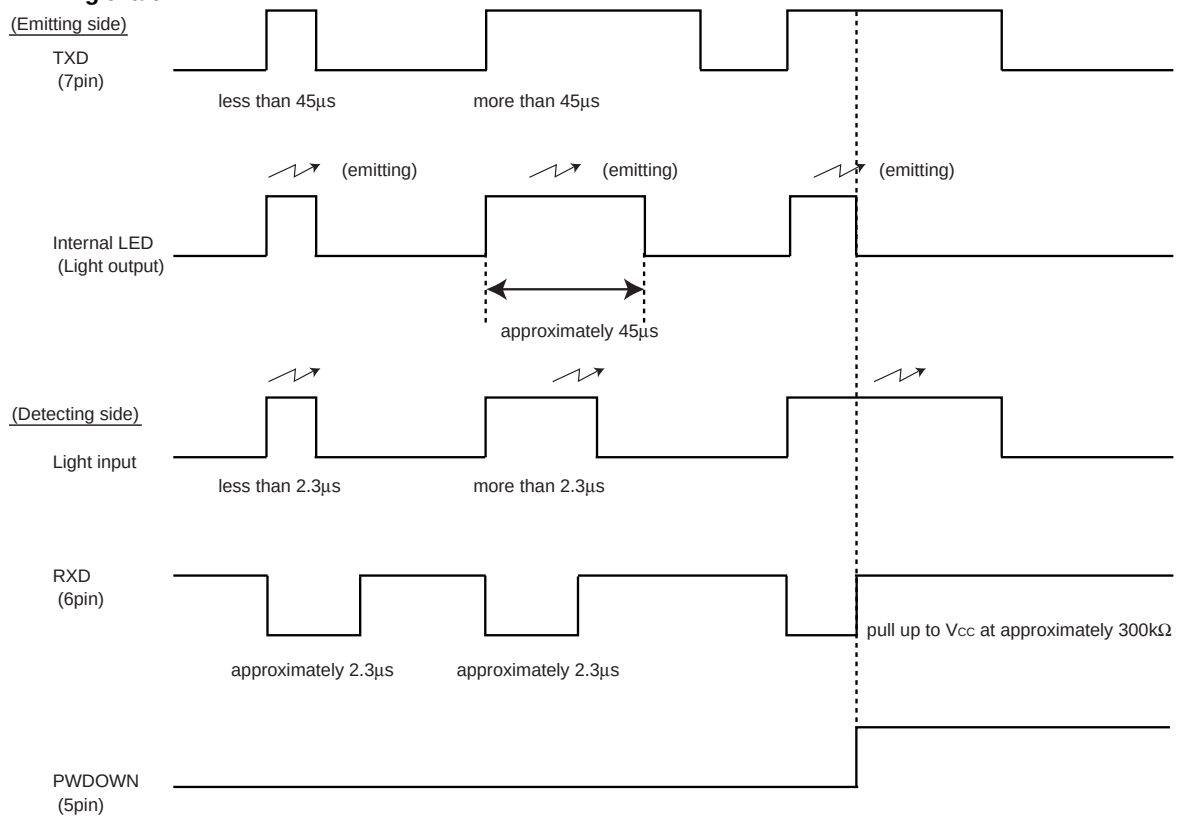
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Consumption current1	$I_{CC}1$	–	73	99	μA	Stand-by for receiving At no input light
Consumption current2	$I_{CC}2$	–	0.01	0.2	μA	PWDOWN PIN High At no input light
Transmission rate		2.4	–	115.2	kbps	
PWDOWN INPUT High voltage	VPDH	V_{CC}–0.55	–	–	V	
PWDOWN INPUT Low voltage	VPDL	–	–	0.55	V	
PWDOWN INPUT High current	IPDH	–1.0	0	1.0	μA	PWDOWN=V_{CC} [V]
PWDOWN INPUT Low current	IPDL	–1.0	0	1.0	μA	PWDOWN=0 [V]
<Transmitter>						
TXD INPUT High voltage	VTXH	V_{CC}–0.55	–	–	V	
TXD INPUT Low voltage	VTXL	–	–	0.55	V	
TXD INPUT High current	ITXH	7	14	28	μA	TXD=V_{CC} [V]
TXD INPUT Low current	ITXL	–1.0	0	1.0	μA	TXD=0 [V]
LED ANODE current	ILEDA	–	144	–	mA	R1=7.5 [Ω]
<Receiver>						
RXD OUTPUT High voltage	VRXH	V_{CC}–0.5	–	–	V	IRXH=–50μA
RXD OUTPUT Low voltage	VRXL	–	–	0.4	V	IRXL=200μA
RXD OUTPUT rise time	tRR	–	70	–	ns	C_L=15pF
RXD OUTPUT fall time	tFR	–	30	–	ns	C_L=15pF
RXD OUTPUT pulse width	twRXD	1.5	2.3	3.6	μs	C_L=15pF, 2.4 to 115.2kbps
Receiver latency time	tRT	–	100	300	μs	

●**Optical characteristics** (Unless otherwise noted, V_{CC}=2.8V, VLEDV_{CC}=2.8V, Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Peak wave length	λP	850	870	900	nm	
Intensity1	IE1	14.4	36	93.6	mW/Sr	–15°≤θL≤15° R1=7.5 [Ω]
Half-angle	θL/2	–	±18	±30	deg	
Rise time / Fall time	Tr/Tf	–	–	100	ns	10% to 90%
Optical over shoot		–	–	25	%	
Edge jitter	Tj	–40	–	40	ns	
Irradiance in angular	Ee	0.0068	–	500	mW/cm²	–15°≤θL≤15°
INPUT Half-Angular	θD/2	±15	–	–	deg	
Maximum emitting time	TLEDmax	10	45	96	μs	TXD=V_{CC}

1. This product is not designed for protection against radioactive rays.
2. This product dose not include laser transmitter.
3. This product includes one PIN photo diode.
4. This product dose not include optical load.

●**Timing chart**



●**Attached components**

Recommended values

Part symbol	Recommended value	Notice
C1	1µF, tantalum or ceramic Ex.) TCFGA1A105M8R (ROHM)	Bigger capacitance is recommended with much noise from power supply
R1	7.5Ω±5%, 1/4W (VLEDVcc=2.8V)	More than 60cm distance, more than 4[µW/cm^2] at detecting side. (vs ver1.0)
		More than 46cm distance, more than 6.8[µW/cm^2] at detecting side. (vs RPM871-H14)

In case of using R1 with different condition from the above, formula is as follows :
LED resistance value : R1[Ω], LED average consumption current : ILED[mA], Supply voltage : VLEDVcc[V],
Link distance : d[cm] (Including LED's distribution within ±15deg)

$R1=T \times (VLEDV_{CC}-1.45) / d^2-3.5\ [\Omega]$
$ILED=Duty \times (VLEDVCC-1.36) / (R1+2.5)\ [A]$
Duty : LED duty at emitting
T : 17300 (vs. RPM871-H14), 29400 (vs. ver1.0)

∗ Please set up to be ILED / Duty < 200[mA] (Duty < 20%)

●Notes

1) LEDV_{CC} (8pin) and V_{CC} (3pin)

・Other power source can be used difference between LEDV_{CC} and V_{CC}.

2) Caution in designing board lay-out

To get maximum potential from RPM871-H14, please keep in mind following instruction.

・The line of RXD (6pin) should be connected at backside via through hole close to RPM871-H14 pin lead. Better not to be close to photo diode side (1pin).

⇒This is to minimize feedback supplied to photo diode from RXD.

・As for C1 between 3-4 pin should be placed close to RPM871-H14.

・Better to be placed more than 1.0cm in radius from photo diode (pin1 side) and also away from the parts which generates noise, such as DC / DC converter.

3) Others

・Please be sure to set up the TXD (7pin) input to be “L” (under 0.55V) except transmitting data (for < 90μsec. on duty < 20%).

・Power down current might increase if exposed by strong light (ex. direct sunlight) at power down mode.

・Please use by the signal format which is specified by IrDA Ver1.2 (2.4k to 115.2kbps). There might be on error if used by different signal format.

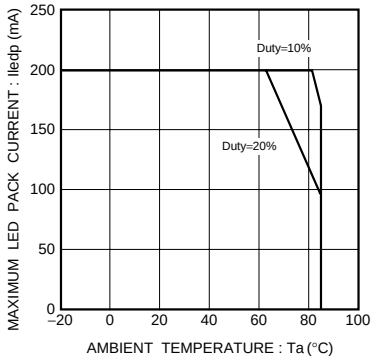
・Dust or dirt on lens portion may affect the characteristics, so pay sufficient attention.

4) LED current derating and ambient temperature

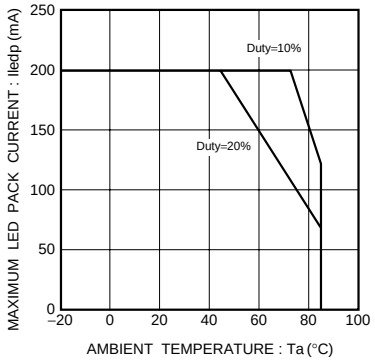
The relation between LED peak current and maximum ambient temperature is shown below.

We recommend you to use within the range as indicated in below.

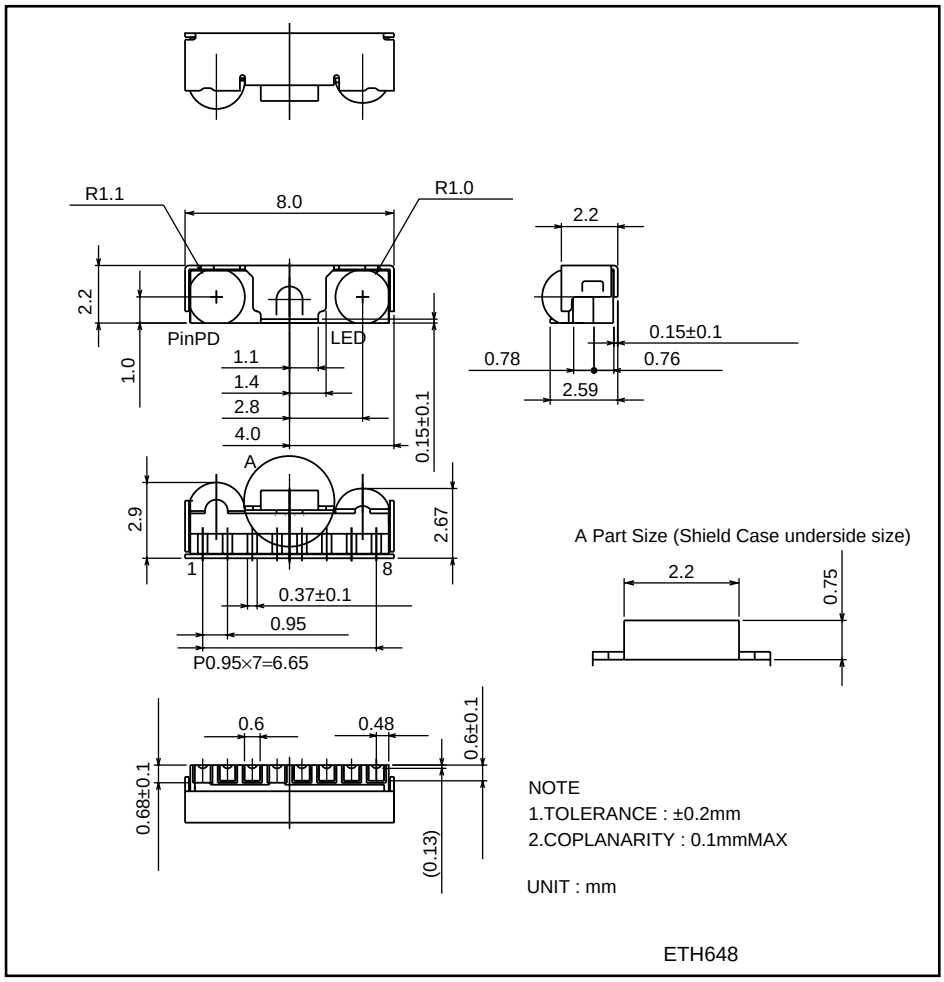
a) When glass-epoxy board (70×70×1.6mm) mounted.



b) RPM871-H14



●**External dimensions** (Unit : mm)



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